

Remarks

Claims 21-37 are now pending in this application. Applicants have amended claims 21, 22, 29 and 31. Applicants respectfully request favorable reconsideration of this case.

The amendments to claims 21, 22, 29 and 31 are supported by the specification and drawings. Along these lines, the specification describes and illustrates the robot elements at page 1, second paragraph and in Fig. 5. Also, Fig. 4 illustrates a portion of the distal half of the ball of the joint being engaged by the bearing member and surrounded by the joint socket.

With respect to the objection to the drawings, Fig. 1 shows the grooves engaging and deforming the bearing member since the bearing member is shown installed in the socket. Accordingly, Applicants respectfully request withdrawal of the objection to the drawings.

The Examiner rejects claims 21-37 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent 4,976,582 to Clavel in view of U.S. patent 2,733,085 to Latzen and U.S. patent 4,430,016 to Matsuoka.

The combination of Clavel, Latzen and Matsuoka does not suggest the present invention as recited in claims 21 or 29, since, among other things, the combination does not suggest a ball and socket joint that includes a bearing member that engages at least a portion of a distal half of the joint ball. On the contrary, Latzen clearly describes and shows in Figs. 1-4 and particularly with the arc illustrated in Figs. 1-3, that the ball is engaged in a proximal region directly adjacent

the rod that the ball is connected to. The cylindrical annular surface would engage only the center line of the ball since it is not arcuate.

Additionally, Latzen discloses a socket that surrounds the ball. This is shown in all of the figures of Latzen. Figs. 1 and 2 of Latzen do not illustrate the upper portion of the socket, but it is clear from these figures that the socket extends entirely about the ball with the exception of the rod to which the ball is connected. This is necessary for the steering joint suggested by Latzen to properly function.

By entirely surrounding the ball and including a bearing surface that extends about the ball where the ball is connected to a rod, the movement of the ball within the socket is quite restricted. The combination of references would include such an arrangement.

On the other hand, the present invention includes a socket that extends about one-half of the ball or less and a bearing member that engages at least a portion of both the proximal and distal ends of the ball. The arrangement of the present invention minimizes friction and provides the delta robot with a desired degree of freedom of movement of the delta robot. Additionally, the present invention provides a low weight design that can have a stroke time of about 0.5 sec. The present invention also provides an easily replaceable bearing means that may be exchanged regularly to achieve minimized uneven wear.

The arrangement recited in claims 21 and 29 is contrary to the disclosure of Latzen. Along these lines, at col. 1, lines 32-36, Latzen describes how the "narrow dish-shaped" bearing

surface is arranged at the exit of the housing. Such an arrangement reduces rather than increases the working envelope. As a result, Latzen does not suggest the present invention particularly due to the restriction that such an arrangement places on the movement of the ball and rod to which the ball is connected. In fact, the restricted movement of the joint suggested by Latzen would make the present invention useless due to minimized movability and excessively high friction in the joint. As a result, the combination of Latzen and Clavel does not even make any sense. A person or ordinary skill in the art would not look to Latzen to solve the problem of minimized friction and uneven wear.

Since the socket structure of both Latzen and Matsuoka et al. surround the ball of the ball and socket joint, not only would the structures not provide the degree of movement possible with the structure according to the present invention, but they would also not provide the possibility to quickly change the bearing member. The structure according to the present invention, which includes a joint socket that encloses the joint ball with a structure that includes approximately one-half of the ball or less, permits quick changing of the bearing member. On the other hand, all of the drawings of Latzen and Matsuoka et al. illustrate socket portions that extend about all or much more than half of the ball of the joint. By only enclosing approximately one-half of the ball or less the present invention provides minimal friction in the joint, which helps to provide the robot with a quick stroke time, which may be on the order of about 0.5 seconds. In spite of only covering approximately one-half of the ball or less, the present invention the bearing member is firmly fixed in the socket of the joint, such that the joint can withstand the rotational and directional movements that such joints encounter in use.

In view of the above, the combination of Clavel, Latzen and Matsuoka does not suggest the present invention as recited in claims 21 or 29 or claims 22-28 and 30-37, dependent thereon.

In view of the above, the references relied upon in the office action, whether considered alone or in combination, do not suggest patentable features of the present invention. Therefore, the references relied upon in the office action, whether considered alone or in combination, do not make the present invention obvious. Accordingly, Applicants respectfully request withdrawal of the rejections based upon the cited references.

In conclusion, Applicants respectfully request favorable reconsideration of this case and early issuance of the Notice of Allowance.

If an interview would advance the prosecution of this case, Applicants urge the Examiner to contact the undersigned at the telephone number listed below.

The undersigned authorizes the Commissioner to charge fee insufficiency and credit overpayment associated with this communication to Deposit Account No. 22-0261.

Respectfully submitted,

Date: 11/1/05


Eric J. Franklin, Reg. No. 37,134
Venable LLP
575 7th Street, NW
Washington, DC 20004
Telephone: 202 344-4936